IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit	: 1764
Examiner	: W. Griffin
Serial No.	: 09/601,414
Filed	: August 1, 2000
Inventors	: Masahito Yoshikawa
	: Hajime Kato
Title	: METHOD FOR CONVERTING
	: AROMATIC COMPOUNDS

Confirmation No.: 2306

Docket: 1344-00

DECLARATION OF MASAHITO YOSHIKAWA

I, MASAHITO YOSHIKAWA, hereby declare that I reside in Nagoya, Japan, and that I am an employee of Toray Industries, Inc. of Japan.

I graduated in 1986 from the master course at Kyoto University, and received my degree of doctor of engineering from Kyoto University after having studied during 1994-1996 at the California Institute of Technology in the United States.

In 1986, I became an employee in ~~the chemical laboratory at~~ Toray Industries, Inc., June 14, 2[...] M.Y. and have continuously been an employee of that corporation to the present date. My studies and my professional field relate to catalyst chemistry, especially the synthesis of zeolites.

I am one of the inventors of the above-identified U.S. patent application, and am thoroughly familiar with the subject matter thereof. Additionally, I have studied the references cited by the U.S. Patent Examiner in the Official Action dated February 15, 2002. I have determined that the subject matter of the pending application is sharply distinguishable from the cited references.

Each reference discloses a process for converting hydrocarbon compounds using either a CIT-5, an SSZ-31, an a UTD-1 zeolite catalyst, respectively. However, all references disclose only the isomerization of xylene as an example of isomerization. I have detailed experience in the fields of xylene isomerization and dichlorotoluene isomerization, and I have applied for various Japanese patents on xylene isomerization (JP08-27040, JP08-24659 and JP08-24660). From my experience, MFI zeolite catalyst is more suitable for xylene isomerization than MOR zeolite catalyst. And MOR zeolite catalyst is more suitable for dichlorotoluene isomerization than MFI zeolite catalyst. The selection of a suitable zeolite for isomerization depends on the kind of isomerized aromatic compounds. So, even

if it is described in the prior art that a SSZ-31, a CIT-5 or a UTD-1 is a good catalyst for xylene isomerization, it is not obvious that a particular claimed zeolite is suitable for the isomerization of the specific compounds defined in the claims of our patent application Serial No. 09/601,414.

Isomerization is a reaction within a single molecule. A collision between molecules is not desirable for an isomerization reaction.

Accordingly, I have found that rapid penetration of a molecule through the pores of the zeolite is very important. Our claimed zeolite has a one-dimensional pore system for large aromatic compounds, and such a pore system is unfavorable for the rapid penetration of a large molecule. Smaller crystals of our claimed zeolites give a faster penetration of the molecule. Accordingly, smaller crystals are more suitable for isomerization. However, all of this depends on the particular kind of reaction, the particular pore size of the zeolite and the particular sizes of the aromatic compounds. For example, crystal size may not be important for a zeolite having a 3-dimensional pore-system and the reaction of very small molecules compared with the pore size of the zeolite.

Thus, a person skilled in the science of catalyst chemistry would not think it obvious to refer to isomerization of xylene, as described in the prior art, as being a valid reference point in attempting to discover a catalyst for isomerizing large aromatic compounds such as (a), (b) and (c) as defined at the end of our Claim 1.

The undersigned declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and thus such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: June 14, 2002

By: Masahito Yoshikawa
Masahito Yoshikawa

Tech Brief

Particle Size – US Sieve Series and Tyler Mesh Size Equivalents

Background

Sieving or screening is a method of separating a mixture or grains or particles into 2 or more size fractions, the over sized materials are trapped above the screen, while undersized materials can pass through the screen.

Sieves can be used in stacks, to divide samples up into various size fractions and hence determine particle size distributions.

Sieves and screen are usually used for larger particle sized materials i.e., greater than approximately 50µm (0.050mm).

Size Equivalents

Two scales that are used to classify particle sizes are the US Sieve Series and Tyler Equivalent, sometimes called Tyler Mesh Size or Tyler Standard Sieve Series. The most common mesh opening sizes for these scales are given in the table below and provide an indication of particle sizes.

US Sieve Size	Tyler Equivalent	Opening	
		mm	in
-	2½ Mesh	8.00	0.312
-	3 Mesh	6.73	0.265
No. 3½	3½ Mesh	5.66	0.233
No. 4	4 Mesh	4.76	0.187
No. 5	5 Mesh	4.00	0.157
No. 6	6 Mesh	3.36	0.132
No. 7	7 Mesh	2.83	0.111
No. 8	8 Mesh	2.38	0.0937
No. 9	9 Mesh	2.00	0.0787
No.10	10 Mesh	1.68	0.0661
No. 12	12 Mesh	1.41	0.0555
No. 14	14 Mesh	1.19	0.0469

No. 16	16 Mesh	1.00	0.0394
No. 20	20 Mesh	0.841	0.0331
No. 25	24 Mesh	0.707	0.0278
No. 30	28 Mesh	0.595	0.0234
No. 35	32 Mesh	0.500	0.0197
No. 40	35 Mesh	0.420	0.0165
No. 45	42 Mesh	0.354	0.0139
No. 50	48 Mesh	0.297	0.0117
No. 60	60 Mesh	0.250	0.0098
No. 70	65 Mesh	0.210	0.0083
No. 80	80 Mesh	0.177	0.0070
No.100	100 Mesh	0.149	0.0059
No. 120	115 Mesh	0.125	0.0049
No. 140	150 Mesh	0.105	0.0041
No. 170	170 Mesh	0.088	0.0035
No. 200	200 Mesh	0.074	0.0029
No. 230	250 Mesh	0.063	0.0025
No. 270	270 Mesh	0.053	0.0021
No. 325	325 Mesh	0.044	0.0017
No. 400	400 Mesh	0.037	0.0015

The mesh number system is a measure of how many openings there are per linear inch in a screen. Sizes vary by a factor of v2. This can easily be determined as screens are made from wires of standard diameters, however, opening sizes can vary slightly due to wear and distortion.

US sieve sizes differ from Tyler Screen sizes in that thay are arbitrary numbers.

Primary author: AZoM.com

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